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RESEARCH ARTICLE

ALGAL FLORA OF SUGAR INDUSTRY WASTE WATER

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Abstract

Sugar industry waste water is one of the sources of water pollution. It is rich in organic contents. This polluted water can affect the growth of certain organisms as well as provide nutrients to other organisms. During present research work algal diversity, and physico chemical assessment of sugar industry waste water has been studied. The experimental work was carried out for two consecutive years i.e. from Jun 2015 to May 2017. Algal samples were collected at monthly intervals from waste water of Maa Bageshwari sugar industry located at Partur tahsil of Jalna district of Maharashtra. Physico chemical assessment of sugar industry wastewater was performed by selecting certain physico chemical parameters. A total of 48 species under 29 genera belonged to Chlorophyceae, Bacillariophyceae, Euglenophyceae and Cyanophyceae were identified and recorded. Cyanophycean algal texa dominated algal flora.

Introduction:-

Sugar industry waste water is one of the sources of water pollution. It is rich in organic contents, which is responsible for pollution of water. Review of literature reveals that very little work has been carried out on algal flora of sugar industry wastewater. Vijay Kumar and Thajuddin (2007), Nerpagar and Nandan (2011) , Kumar et.al, (1974), Gaur and Kumar (1981) and Reddy et.al (1983). In present study algal Flora of sugar industry waste water has been encountered and physico chemical assessment of waste water was carried out for quality of water.

Materials and Methods:-

In order to study algal flora of sugar industry waste water, algal samples were collected from Maa Bageshwari sugar industry located in Partur tehsil area of Jalna district of Maharashtra. The collection was carried out during two consecutive years i.e. from June 2015 to May 2017. Algal samples were collected at monthly intervals in acid washed collection bottles. Algal samples were preserved in 4% formalin for further taxonomic investigations. Fresh as well as preserved algal forms were observed under microscope and identified with the help of standard literature on algae (Smith 1950, Prescott 1951, Desikacharya 1959, Philipose 1960, and Sarode and Kamat1984.)

Physico chemical assessment of sugar industry waste water was carried out to understand quality of water by following Trivedi and Goel (1984) and APHA (2005). These 17 parameters were selected for water analysis Colour, Odour, Water temperature, pH, Calcium, Magnesium, Chloride, Nitrate, Total Phosphorus, Potassium, Silica, Sulphate, TDS, Total hardness, Dissolved oxygen, Free Carbon dioxide and Biological oxygen demand. Physico chemical analysis was performed at seasonal interval.

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Result and Discussion:-

A total of 48 species under 29 genera were identified and recorded (Table 1). Of these 12 species under 10 genera belonged to Chlorophyceae, 07 species under 03 genera belonged to Bacillariophyceae, 03 species under 02 genera belonged to Euglenophyceae and 26 species under 14 genera belonged to Cyanophyceae. Cyanophycean algal members are dominant algal flora of sugar industry waste water.which is followed by Chloropyceae, Bacillariophyceae and Euglenophyceae.Vijay Kumar et al, (2007) studied biodiversity of cyanobacteria in industrial effluents. Nerpagar and Nandan (2011) studied biodiversity of algal communities from effluent of certain factories. Seasonal variation study of algal flora reveals that chlorophycean members were dominant during winter and summer months. Diatoms and Euglenoids were observed maximum in summer months. Cyanophycean members were also found maximum in summer season.

Physico chemical analysis of sugar industry waste water reveals that colour of water was brownish with unpleasant odour. Water temperature was 30 ^{0}C and pH was 6.26. Calcium content of water was 112mg/L. The concentration of Magnesium was 51mg/L. The amount of Chloride was 127mg/L indicates that water is polluted. Raina et.al, 1984, Nitrate content was 1.26mg/L.Amount of Phosphorous was 34.05mg/L. Zafar (1964) observed abundance of diatoms due to high concentration of phosphorus. Potassium content of water was 18 mg/L. which is favorable for algal growth especially Chlorophyceae, Cyanophyceae and diatoms (Munawar 1970). The Concentration of Silica was 1.57mg/L which is essential for growth of diatoms. The concentration of sulphate was 82.50mg/L. Total dissolved solid was high 925mg/L recorded. Total hardness was 490 mg/L. Dissolved oxygen in water was not observed. Free carbon dioxide in the water was 241mg/L, whereas biological oxygen demand was 107mg/L.

Table 1:- Algal taxa recorded from sugar industry waste water.

CHLOROPHYCEAE

Gloeocystis gigas, Gloeocystis major,Tetraspora lamellosa,Ulothrix tenerrima, Ulothrix variabilis , Stigeoclonium subsecundum, Oedogonium sp, Chlorococcum humicola , Trebouxia humicola , Chlorella vulgaris ,Selenastrum westii, Scenedesmus longus.

BACILLARIOPHYCEAE

Fragilaria brevistriata, Fragilaria construens, Pinnularia sp ,Nitzschia irremissa, Nitzschia obtusa,Nitzschia palea, Nitzschia vasnii.

EUGLENOPHYCEAE

Euglena polymorpha. Euglena proxima,Trachelomonas sp.

CYANOPHYCEAE

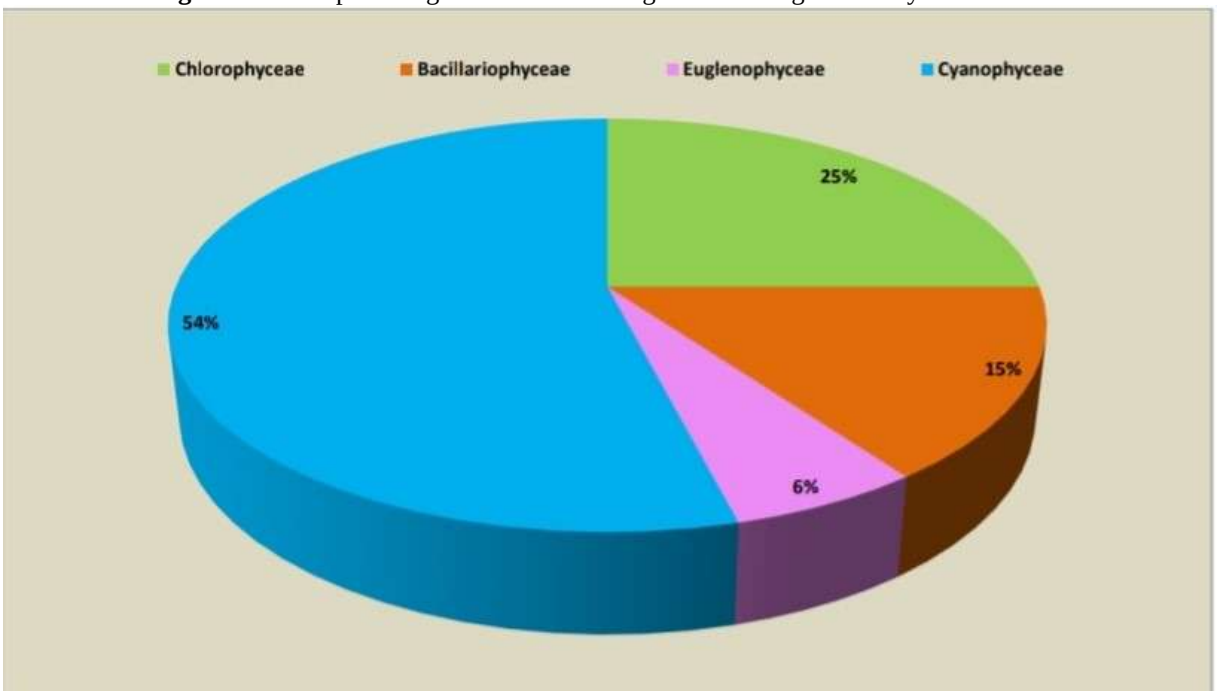
Microcystis aeruginosa, Chroococcus minor, Chroococcus minutes,Gloeocapsa aeruginosa , Gloeothece palea,Aphanocapsa pulchera, Aphanothece nidulans, Aphanothece saxicola, Myxosarcina burmensis,Arthrospira platensis, Spirulina laxissima, Oscillatoria acuminata , Oscillatoria acuta, Oscillatoria animalis, Oscillatoria obscura, Oscillatoria pseudogeminata,Oscillatoria quadripunctulata, Oscillatoria subbrevis, Phormidium abronema, Phormidium jenkelianum, Phormidium molle, Phormidium usterii, Lyngbya hieronymusii, Plectonema gracillimum, Plectonema nostocorum.Scytonema bohneri.

Table 02:- The average values of physicochemical parameters of sugar industry waste water.

Sr.No.	Parameter	Observations	Unit
01	**Colour**	Brownish	Hazen
02	**Odour**	Unpleasant	-----
03	**Water temperature**	30	^{0}C
04	**pH**	6.25	--
05	**Calcium**	112	mg/L
06	**Magnesium**	51	mg/L
07	**Chloride**	127	mg/L
08	**Nitrate**	1.26	mg/L
09	**Total Phosphorus**	34.05	mg/L
10	**Potassium**	18	mg/L
11	**Silica**	1.57	mg/L

12	**Sulphate**	82.50	mg/L
13	**Total Dissolved Solids**	925	mg/L
14	**Total Hardness**	490	mg/L
15	**Dissolved Oxygen**	00	mg/L
16	**Free Co2**	241	mg/L
17	**Biological oxygen demand**	107	mg/L

Fig:- Class wise percentage contribution of algal flora of sugar industry waste water.



Conclusion:-

It is concluded that sugar industry waste water where algae can grow and found in divers form. Physico chemical assessment of water reveals that there is positive correlation between physico chemical parameters and algal flora. Seasonal variation study reveals that winter and summer seasons were found to be more suitable for growth of algae in sugar industry waste water.

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